Development of a Pharmacy Technician–Driven Program to Improve Vaccination Rates at an Academic Medical Center

Hospital Pharmacy
2017, Vol. 52(9) 617–622
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DOI: 10.1177/0018578717722788
journals.sagepub.com/home/hpx

John D. Hill¹, Sammuel V. Anderegg², and Rick J. Couldry³

Abstract

Background: Influenza and pneumococcal disease contribute substantially to the burden of preventable disease in the United States. Despite quality measures tied to immunization rates, health systems have struggled to achieve these targets in the inpatient setting. Pharmacy departments have had success through implementation of pharmacist standing order programs (SOP); however, these initiatives are labor-intensive and have not resulted in 100% immunization rates. **Objective:** The objective of this study was to evaluate a pilot utilizing pharmacy technician interventions, in combination with a nursing SOP, to improve vaccination rates of hospitalized patients for influenza and pneumococcal disease. **Methods:** A process was developed for pharmacy technicians to identify patients who were not previously screened or immunized during the weekend days on the Cardiovascular Progressive Care unit at the University of Kansas Health-System. Targeted pharmacy technician interventions consisted of phone call reminders and face-to-face discussions with nursing staff. The primary study outcome was the change in immunization compliance rates between the control and intervention groups. **Results:** Influenza vaccine rates showed a statistically significant increase from 72.2% (52 of 72) of patients during the control group to 92.9% (65 of 70, $P = .001$) of patients during the intervention group. A pneumococcal vaccination rate of 81.3% (61 of 75) was observed in the control group, compared with 84.3% (59 of 70) of patients in the intervention group ($P = .638$). **Conclusion:** An improvement in inpatient influenza immunization rates can be achieved through targeted follow-up performed by pharmacy technicians, in combination with a nursing-driven SOP.

Keywords

pharmacy, pharmacy practice, pharmacy technicians, immunizations, vaccines, pharmacy advancement initiative, pharmacy management

Introduction

As health care reform evolves, innovative care-delivery models are continually being developed. In an effort to ensure the cost-effective delivery of high-quality patient care, an emphasis is being placed on optimally positioning all members of the health care team to function at the top of their respective licenses. The increased focus these initiatives have placed on quality and outcomes have led to the development of several new programs which link key performance metrics to health-system reimbursement. As a component of ensuring optimal preventive care, The Joint Commission enacted a Core Measure in 2012 requiring hospitals to vaccinate or document contraindication or refusal of the influenza vaccine for patients six months and older and the pneumococcal vaccine for patients six years and older.¹ In addition, current guidance from the Advisory Committee on Immunization Practices (ACIP) recommends the administration of influenza vaccine annually in all

patients ≥ 6 months of age.² ACIP also recommends pneumococcal vaccination in patients ≥ 19 years of age with an immunocompromising condition and in immunocompetent adults with congestive heart failure, chronic obstructive lung disease, asthma, diabetes mellitus, chronic liver disease, alcoholism, and cigarette smokers. Pneumococcal vaccination is recommended for all immunocompetent patients ≥ 65 years of age.³⁻⁴ Due to variations in existing guidelines and recommendations, data collection for pneumococcal vaccination rates was suspended and reporting became

¹The Johns Hopkins Hospital, Baltimore, MD, USA

²Pharmacy Health Information Technology Collaborative, Austin, TX, USA

³The University of Kansas Health-System, Kansas City, KS, USA

Corresponding Author:

John D. Hill, Operations Manager, Adult Inpatient Pharmacy, The Johns Hopkins Hospital, 1800 Orleans Street, Room 7000, 21287, Baltimore, MD, USA.

Email: jhill71@jhmi.edu

voluntary to the Centers of Medicare and Medicaid Services in 2014.¹ These disease states contribute substantially to the national disease burden with influenza resulting in an average of more than 200,000 excess hospitalizations annually and 37% of all hospitalizations for individuals greater than 65 years of age.⁵ Pneumococcal pneumonia results in an estimated 400,000 hospitalizations per year with a case fatality rate of 5% to 7%.⁶ In adults 65 years of age or older, influenza and pneumonia combined are the fifth leading cause of death in the United States.⁷ Despite the benefits of immunization in disease prevention, data suggest that inpatient immunization rates for hospitalized patients are low.⁸ Further highlighting the missed opportunities associated with immunizing hospitalized patients is the finding that two-thirds of vaccine-eligible inpatients had a prior hospitalization within the previous five years but were unvaccinated.⁸⁻⁹ In an effort to combat the high disease burden of these preventable diseases and align with quality metrics, health-systems have been challenged to optimally align their resources in an effort to improve inpatient vaccination rates.

With the increased focus on quality and outcomes, pharmacy departments have been involved in several initiatives targeted at improving vaccination rates. However, the optimal role of health-system pharmacists and pharmacy departments in improving inpatient vaccination rates has not been well described. The American Society of Health-System Pharmacists guidelines on the pharmacist's role in immunization recommend pharmacists be involved in history and screening, patient counseling, documentation, formulary management, administrative measures, and public education regarding immunizations.¹⁰⁻¹² An effective strategy which has been recommended and employed by many health-systems includes a standing orders program (SOP), which enables nurses and pharmacists as allowed by state law, to screen patients for eligibility and administer vaccinations in the absence of a physician order.¹³⁻²¹ Pharmacists have previously demonstrated their value in improving vaccination rates through targeted follow-up reminders to physicians and pharmacist-managed SOP's.^{8,22-26} An additional method utilized by pharmacy departments has been development of a collaborative drug therapy management (CDTM) agreement which authorized pharmacists to write influenza and pneumococcal orders for eligible patients which similarly resulted in improved vaccination rates.²⁷ These pharmacy-driven initiatives have led to improved inpatient vaccination rates but have been resource-intensive consisting of manual chart review, patient interviews, and follow-up. These initiatives were also predominantly focused on pharmacist activities and involvement. However, data supporting pharmacy technician involvement in pharmacy-department wide initiatives to improve vaccination rates in the inpatient setting are limited. The purpose of this study was to evaluate a pilot utilizing pharmacy technician interventions, in combination with a nursing SOP, to improve vaccination rates during the weekend days.

Background

The University of Kansas Health-System (UKH) is a 759-bed tertiary, academic medical center located in Kansas City, Kansas. The UKH practice model is an integrated, team-based, patient-centered, care model, with pharmacist services provided along clinical service line. A recent practice model change has facilitated increased involvement of pharmacy personnel in both the admission and discharge medication reconciliation process leading to a decrease in readmissions.²⁸ Pharmacy technicians play a pivotal role in completing these admission medication reconciliations, through the emergency department, general nursing floors, and preoperatively. In addition, pharmacy technicians are involved in several nontraditional roles including management of other pharmacy technicians, nonsterile compounding operations, technician-check-technician for manual automated dispensing cabinet (ADC) refills, and oversight of pharmacy purchasing. The UKH utilizes a hybrid dispensing model with ADCs located on nursing units. Pharmacy technicians serve in decentralized roles to refill medications in the ADCs, hand-deliver medications to the floor, and interact with nursing to facilitate medication reconciliation.

The achievement of the goal of immunizing 100% of patients for either the influenza or pneumococcal vaccines has been challenging to accomplish at UKH. Nurses have been charged with the task to screen, order, and administer pneumococcal and influenza vaccines for all patients admitted utilizing an SOP. In completing the vaccination process, nurses currently fill out the admission documentation utilizing the "Admission Navigator" function within the electronic medical record (EMR), Epic (Epic System Corporation, Verona, Wisconsin). The navigator guides nursing through a standard list of questions to identify patients indicated for either the influenza or pneumococcal vaccine or to document patient refusal or contraindication. Once patients have been screened with this tool, the documentation process is completed through an order set. While this process is frequently accomplished, some patients may be discharged without appropriate screening or immunization. Nurse managers and the infectious disease pharmacist receive reports Monday through Friday on all admitted patients who do not have a completed vaccination order set to facilitate appropriate follow-up. However, this same activity is not performed on weekends, primarily due to changes in staffing levels.

Methods

A process was designed and implemented to identify, screen, and administer immunizations to patients indicated for the influenza and pneumococcal vaccines during weekend days on the 32-bed Cardiovascular Progressive Care (CVP) unit at the UKH. A pre/post analysis was conducted to assess immunization rates over four consecutive weekends in October 2011. During the first two weekends of the study period, the

Table 1. Immunization Compliance Rates for the Control and Intervention Groups.

Patients	Pre-weekend, n (%)	Post-weekend, n (%)	Change, n (%)	P value
Influenza				
Control	34/72 (47.2)	52/72 (72.2)	18 (+25.0)	.001
Intervention	56/70 (80.0)	65/70 (92.9)	9 (+12.9)	
Pneumococcal				
Control	47/75 (62.7)	61/75 (81.3)	14 (+18.6)	.638
Intervention	52/70 (74.3)	59/70 (84.3)	7 (+10.0)	

patients in the control group received the standard of care which consisted of nursing ownership, through an SOP, of the immunization administration and documentation process. During the last two weekends of the study period, patients in the intervention group received the standard of care in addition to pharmacy technician intervention. The pharmacy technician intervention consisted of a review of the immunization status of all patients on the unit and the generation of a list of patients who had not been screened or immunized. Pharmacy technicians notified nurses by phone or direct contact, of patients on the unit who required follow-up to complete the appropriate vaccination documentation. Nursing retained responsibility during the intervention period for completing follow-up by utilizing the immunization screening questions outlined in the vaccine order set and administering or documenting a reason for lack of administration of the appropriate vaccination. Pharmacy technicians received standardized training which reviewed generating the patient list and identifying patients which needed additional follow-up within the EMR. A standardized documentation form was developed and utilized to track patients enrolled, the responsible nurse, and the status of patient follow-up. A script was developed for pharmacy technicians to utilize when speaking with nursing staff which also provided a standard list of expected questions and suggested answers. Pharmacy technicians were advised to complete their first follow-up discussion with nursing by 10 am each morning of the study period. An in-person training session was held with both pharmacy technicians who were participating in this pilot to review project goals, ensure adequate training, and to discuss scripting and appropriate follow-up.

The primary study outcome was the change in immunization compliance rates, as measured prior to and following the study weekends, in both the control and intervention groups. Immunization compliance was defined as appropriate screening, and either administration and documentation of an indicated immunization or documentation of contraindication or patient refusal within the EMR. A retrospective chart review was conducted utilizing an Epic generated report to verify vaccine process completion on Friday evening (pre-weekend) and Monday morning (post-weekend). A chi-square test was utilized to analyze the primary outcome of immunization rate of both the control and intervention groups utilizing SPSS (IBM Corp., Released 2011, IBM SPSS Statistics for

Table 2. Patients Without Vaccination Process Completed Prior to Weekend.

Patients	Vaccine process completed over weekend, n (%)	P value
Influenza		
Control	18/38 (47.4)	.279
Intervention	9/14 (64.3)	
Pneumococcal		
Control	14/28 (50.0)	.46
Intervention	7/18 (38.9)	

Windows, Version 20.0, Armonk, New York) with a *P* value <.05 considered significant.

Results

The primary outcome of change in immunization compliance rates between the control and intervention groups for both influenza and pneumococcal vaccines is shown above in Table 1. Influenza vaccine rates showed a statistically significant increase from 72.2% (52 of 72) of patients completing the immunization and screening process during the control weekends to 92.9% (65 of 70, *P* = .001) during the intervention period, as displayed in Table 1. A pneumococcal vaccination rate of 81.3% (61 of 75) was observed in the control group, compared with 84.3% (59 of 70) of patients in the intervention group (*P* = .638). Of the patients who entered the pre-weekend study period without completion of the influenza vaccination process during the control weekends, a total of 18 of 38 patients (47.4%) completed the immunization process compared with 9 of 14 patients (64.3%) during the interventional weekends, displayed in Table 2. Of the patients who entered the pre-weekend study period without completion of the pneumococcal vaccination process during the control weekends, a total of 14 of 28 patients (50.0%) completed the immunization process compared with 7 of 18 patients (38.9%) during the interventional weekends.

Discussion

Our study findings indicate that the development of an interdisciplinary approach involving targeted follow-up

conducted by pharmacy technicians, in combination with a nursing SOP, resulted in a statistically significant increase in immunization compliance rates for influenza vaccination. Previously published reports have shown pharmacists' ability to improve vaccination rates utilizing clinical reminders to physicians, a pharmacy-driven SOP, and CDTM. The results of this study make pharmacy technician follow-up one of the most successful interventions for improving inpatient vaccination rates to date.^{8,22-27} Due to the relatively low cost of pharmacy technicians in comparison with nursing and pharmacist salaries, the relative cost-effectiveness of this intervention could merit additional investigation.

The results of this study align with several recommendations from the American Society of Health-System Pharmacists Practice Advancement Initiative (PAI) including the expansion of pharmacy technician responsibilities and the development of additional specialized roles.²⁹ A variety of innovative pharmacy technician roles have been previously discussed in the literature including medication reconciliation, technician-check-technician, inventory management and purchasing, and the supervision of other pharmacy technicians.^{28,30-35} However, their optimal role in improving inpatient vaccination rates is less defined. Previously described roles for technicians in improving immunization rates consist of pharmacy technicians assessing patient risk of pneumococcal disease and placing pre-printed vaccine order forms in patient charts for physicians to complete.³⁶ An additional role describes pharmacy technicians who perform screening for vaccinations and generate orders for patients who meet criteria and pharmacist prescribing of vaccines. Pharmacy technicians then performed follow-up to verify vaccine administration and document status in the EMR.²⁶ Our current study differed from these previous programs through the presence of a nursing SOP, essentially removing pharmacists from this process entirely, and only utilizing pharmacy technicians. Our pharmacy technicians were able to implement these services due to their advanced access within the EMR, which enabled them to review clinical patient care information. For a program like this to be successful, similar access would need to be granted to pharmacy technicians serving in advanced roles. The pharmacy technicians involved in this pilot reported satisfaction with knowing they were involved in positively impacting patient care, but that the additional workload was challenging to manage. Innovative roles for pharmacy technicians can be developed which help achieve organizational goals and regulatory compliance by improving immunization rates. These initiatives should be utilized to enable pharmacists to focus on the provision of additional clinical direct patient care activities. Future applications of this model could allow pharmacy technicians to work collaboratively with nursing while freeing pharmacist time to participate in complex drug therapy management services.

Limitations identified with this study include the short duration, four weekends total, two in the control group and two in the intervention group, which resulted in a relatively small sample size. The high vaccination rate observed in the control weekends, particularly in the pneumococcal vaccination group, could have served to underestimate the benefit associated with pharmacy technician involvement in the process. As highlighted in Table 2, the percentage of patients who entered the weekend without the vaccination process completed for the pneumococcal vaccine was higher in the control group than in the intervention group. This result may have been observed due to the high vaccination rate observed prior to the weekend but is otherwise largely unexplained. The nursing staff's awareness of the study could have led to a Hawthorne effect with regard to immunization rates. The increased influenza vaccination rates observed in the intervention group could have been biased by heightened nursing staff awareness as the influenza season progressed prompting them to become more vigilant with regard to screening. Although pharmacy technicians were involved in the immunization process through performing follow-up, ultimate responsibility still rested with the nursing staff on the unit to perform the screening and administration process. Pharmacy technicians were asked to perform these duties in addition to their traditional job duties, and the time requirements of their involvement in this process were not measured as a component of this study. Baseline demographics of patients were not collected; thus, we are unable to determine whether this may have contributed to variations in vaccination rate in any way. In addition, this pilot was only implemented on one nursing unit, which further limited the sample size. Our CVP unit was ideal for this pilot as it is a closed patient care unit with a dedicated pharmacy technician, adequate nurse staffing levels, and nursing leadership interested in partnering with pharmacy. It is possible that vaccination rates on different nursing units vary widely and the study results could have been affected by the selection of a pilot site. In addition, further enhancements to the EMR could be incorporated into the process to automate patient identification and streamline notifications, communication, and follow-up. However, the necessary changes within the EMR can require extensive build time and expense. For the purposes of our pilot, a manual approach allowed us to more rapidly implement our program without requiring any additional resources.

Potential future expansions of this pilot could include hospital-wide implementation along with expansion to weekday provision of a similar service. In addition, if the pharmacy department intended to take full ownership over the immunization process, pharmacy technicians may be able to perform and document the vaccination screening process directly instead of performing follow-up with nursing staff to complete this activity. A pharmacist-driven SOP could be developed, in coordination with pharmacy technicians, allowing nursing to complete the administration process.

With the pharmacy departments' thorough integration within the admission medication reconciliation process, it could be possible to perform this immunization screening on all patients as a component of this patient care activity.

Conclusion

An improvement in inpatient immunization rates for influenza vaccination can be achieved through targeted follow-up performed by pharmacy technicians, in combination with a nursing-driven SOP.

Authors' Note

At the time of writing, John D. Hill and Samuel V. Anderegg were affiliated with the University of Kansas Health-System, Kansas City, KS.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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